

Improving the Manufacturability of an Oral Cancer Diagnosis Training Model

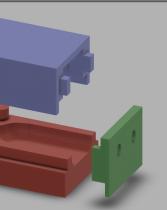
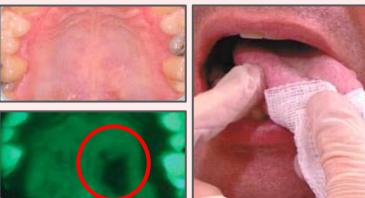
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Need for Early Detection of Oral Cancer

- 450,000+ new cases of oral cancer per year globally
- Low- and middle-income countries have **less access** to high quality care for oral cancer
- Only 29% of cases are diagnosed in early stage
- Dark spots in autofluorescence imaging confirm presence of lesions
- Physicians are trained using pictures and descriptions (not accurate)
- Correctly distinguishing lesions important in monitoring lesion development



Addressing the Problem

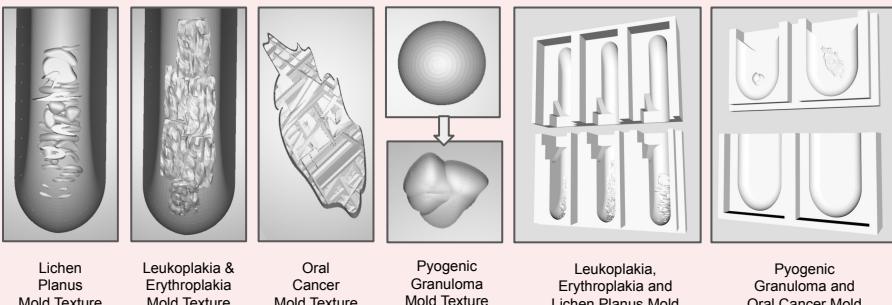
There is currently **no training model** in the market. The only existing prototype is **not standardized**.

- > 8.1 hours to make a complete set
- Different lesions require different assembly procedures
- Lesions require time-consuming art rendering

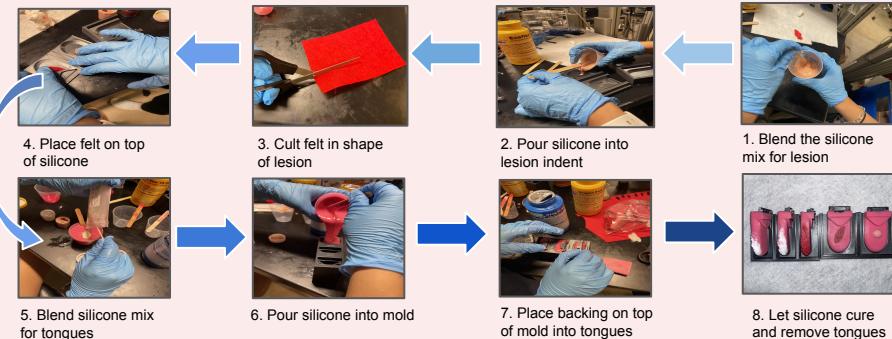
Our solution: Design multi-tongue mold with lesion indents to efficiently produce multiple tongue + lesion models at once



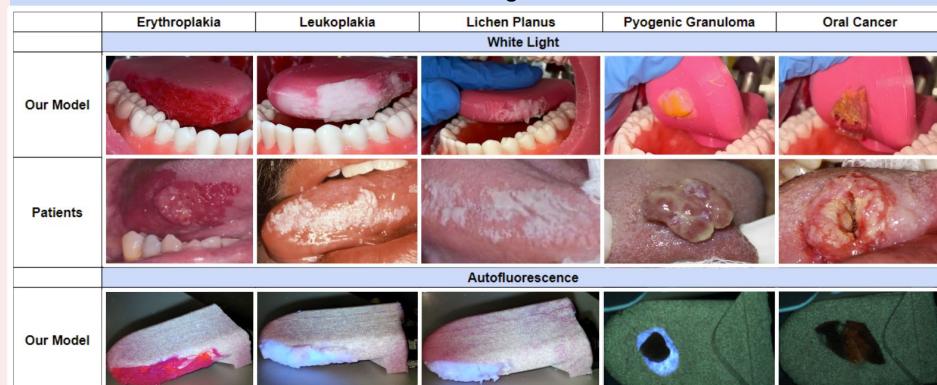
BluNoma's Tongue and Lesion Mold Prototypes



Production Assembly Steps



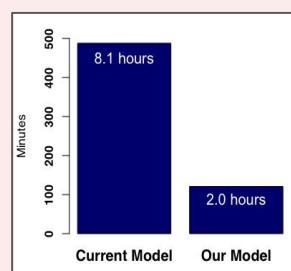
BluNoma's Tongue Model



Testing Plan and Results

Production Time

Average time of each member to produce one tongue model



Accuracy

5-level Likert Scale survey to clinical experts

Lesion	Score
Erythoplakia	3.86
Leukoplakia	3.88
Lichen Planus	3.28
Pyogenic Granuloma	3.86
Oral Cancer	4.00

Assembly Steps

Number of steps from the mixing of silicone to the removal of tongues

Lesion	Previous Model	Team Blunoma
Erythoplakia	11	8
Leukoplakia	11	8
Lichen Planus	11	8
Pyogenic Granuloma	12	8
Oral Cancer	13	8

Material Cost: \$27.80

Our target cost was \$126.57 to be accessible for LMICs

Durability: 5/5

Withstand at least 300 twists, 240 pulls, and 300 palpations without losing quality

Conclusion & Future Work

Conclusion

1. Production time for full model **decreases 4X**
2. Model is **low-cost** and easy to produce
3. Accuracy and durability are maintained

Future work

1. Add lesions to other locations in the oral cavity
2. Improve fluorescence contrast between tongue & lesion
3. Expand model beyond pilot study

References & Acknowledgements

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